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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,802	12/05/2001	Erik Y. Trell	11028-0002	2804

22902 7590 04/16/2007

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EXAMINER	
FERRIS III, FRED O	
ART UNIT	**PAPER NUMBER**
2128	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/001,802	TRELL, ERIK Y.	
	Examiner	Art Unit	
	Fred Ferris	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *5 December 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 November 2006 has been entered. Applicants have canceled claims 1-6. Claims 7-14 remain pending in this application and stand rejected by the examiner.

Drawings

2. The drawings filed 5 December 2001 are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

MPEP Section 608.02(d) [R-2] "Complete Illustration in Drawings" recites the following:

"37 CFR 1.83. Content of drawing.
*(a) The drawing in a nonprovisional application must show **every feature** of the invention **specified in the claims**. However, conventional features disclosed in the description and claims, where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in the drawing in the form of a graphical drawing symbol or a labeled representation"*

In this case, none of the drawings (Figs. 1-32) show the claimed elements or features relating to the claimed "apparatus for producing a model of an elementary particle" required by independent claim 7. In a nutshell, there are no apparatus elements shown in the drawings for realizing a representation of a ground state sphere, or representations of beams as required by the claim. In this instance, the drawings only appear to support the method of constructing a model as recited in claim 11.

Information Disclosure Statement

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specifically, the specification makes reference to numerous publications throughout the specification (See: specification page. 8, "Jaffe (Nature, Vo. 268, p. 201, 1977", "(G. Rosner, Science, Vol. 290, 2000, p 2083)", for example) that have not been properly included in an IDS.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 7-14 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter.

Per claims 7-14: The Examiner first submits that, in view of the language of the claims, independent claims 7 and 11 are abstract and do not appear to recite a concrete and tangible result. In this case the result appears to merely be an abstract set of mathematical relationships (calculations) that are not used to achieve the intended application of producing or constructing a model of an elementary particle. In claims 7 and 11 the result appears to simply be a numerically represented beam using root space vectors (e.g. numbers). The examiner submits that in order to establish a practical application, there must be either a physical transformation, or a useful, concrete and tangible result. Data transformation is not the same as a physical transformation. In this instance, there does not appear to be a concrete and tangible result. Here, the recited method steps appear to simply amount to mathematical calculations describing root space vectors, and not a physical transformation. The claimed elements in this case, are simply a thought or computation, and not in and of themselves a tangible result. It is not until the transformation of the results of the claimed representations of beams from the root space vectors are applied in a meaningful way that it has real world value and becomes a tangible result. Instead, the

result appears to simply be an unapplied and un-stored number resulting from the Lie Algebra coset decomposition.

MPEP 2106 recites the following:

"A. Identify and Understand Any Practical Application Asserted for the Invention
*The claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and **tangible result**." State Street, 149 F.3d at 1373, 47 USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of **"real world" value**, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research (Brenner v. Manson, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96); In re Ziegler, 992, F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993)). Accordingly, a complete disclosure should contain some indication of the practical application for the claimed invention, i.e., why the applicant believes the claimed invention is useful.*
Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See Arrhythmia, 958 F.2d at 1057, 22 USPQ2d at 1036. Merely claiming nonfunctional descriptive material stored in a computer-readable medium does not make the invention eligible for patenting. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some "real world" value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application.
Although the courts have yet to define the terms useful, concrete, and tangible in the context of the practical application requirement for purposes of these guidelines, the following examples illustrate claimed inventions that have a practical application because they produce useful, concrete, and tangible result:
*- Claims drawn to a long-distance telephone billing process containing mathematical algorithms were held to be directed to patentable subject matter because "the claimed process applies the Boolean principle to produce a useful, concrete, **tangible result** without pre-empting other uses of the mathematical principle." AT &T Corp. v. Excel Communications, Inc., 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999);*
- "[T]ransformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces a useful, concrete and tangible result' -- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." State Street, 149 F.3d at 1373, 47 USPQ2d at 1601; and
*- Claims drawn to a rasterizer for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means were held to be directed to patentable subject matter since the claims defined "a specific machine to produce a useful, concrete, and **tangible result**." In re Alappat, 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994)."*

The Examiner further submits that apparatus claim 7, as written, is merely drawn to nonstatutory descriptive material since the claimed "apparatus" appears to consist of only software program elements (i.e. program per se) because claimed system does not impart any functionality as being employed as a computer component. That is, as currently drafted, the claim recites an apparatus (system) of only software elements (or method steps, see 112(2)) with no supporting hardware on which to execute the software elements or method steps. Hence, the apparatus could not operate. Further, the specification does not appear to set forth that claimed "system" would consist of anything other than simply software elements.

MPEP 2106 recites the following supporting rational for this reasoning:

"Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when **employed as a computer component**. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. **Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se.** Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is **recorded on some computer-readable medium** it becomes structurally and **functionally interrelated to the medium** and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized."

Dependent claims inherit the defect of the claims from which they depend.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 7-10, and 14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically, claim 7 recites an apparatus for producing a model of an elementary particle by representation of a ground state sphere and inserted beams from Lie Algebra coset decomposition. However, the specification appears to be completely silent on specifically how these features are realized by apparatus elements. The invention as claimed cannot operate since appears to be no apparatus elements disclosed that can specifically realize the claimed features. It is further noted that the claimed "pliable membrane" does not appear to be sufficiently disclosed in the specification. For example, while the specification mentions (pages 23, 24) that a pliable membrane (or other coating) can be constructed from the domain scaffold, there is no specific teaching of specifically how this would be accomplished. Accordingly, a skilled artisan would be at odds to determine how to implement the claimed pliable membrane from the written description contained in the specification. Dependent claims 8-10 inherit these defects. The examiner also submits that there appears to be no support in the specification for creating the holographic representations recited in dependent claims 10 and 14. Accordingly, for purposes of art rejections the examiner has interpreted this feature to simply be a computer generated graphical representation as would have been well known in the art.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 7-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Per independent claim 7: In this instance, it is unclear if applicants intend to claim an actual apparatus, or simply a method, since the claims do not recite any apparatus elements for carrying out, or realizing the claimed representation of a ground state sphere, or representations of inserted beams from Lie Algebra coset decomposition as required by the claim. Dependent claims 8-10 inherit this defect.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Finite-size effects and infrared asymptotics of the correlation function in two dimensions", Bogoliubov et al, J. Phys. A: Math. Gen. 20, 1987, in view of applicants' own admission. (AOA)

Per independent claims 7 and 8: Bogoliubov teaches a creating a model of elementary particles (Section 3, especially page 5365, paragraph 1) that includes ground states represented by filling a Fermi sphere (page 5363, paragraph 1).

Bogoliubov does not explicitly disclose the use of root space vectors and Lie algebra coset decomposition.

However, as admitted by applicants, and disclosed in the specification, the features relating to root space vectors and Lie algebra coset decomposition were well known in the art at the time of the invention. (See: page 5, last paragraph, page 6, paragraph 2 (Science, Rosner, Vol. 290, 200, p 2083), page 7, paragraphs 2-4, page 8, paragraphs 1-3 (Nature, Jaffe, Vol. 268, p 201, 1977), for example)

Accordingly, a skilled tasked with realizing a method and apparatus for producing a model of an elementary particle, and having access to the teachings of Bogoliubov and applicants admitted prior art, would have knowingly modified the teachings of Boboliubov with the admitted prior art to realized the elements of the present invention as presently claimed. An obvious motivation exists since, as recognized in applicants admitted prior art, it has already been established that coset decomposition algebra can be projected in real geometry. (See: page 5, last paragraph, Kleppner and Jackow)

8. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable in further view of IRIS Explorer User's Guide" Release 5.0, The Numerical Algorithms Group, Ltd, 2000.

Per independent claim 11: As noted above, Bogoliubov teaches a creating a model of elementary particles (Section 3, especially page 5365, paragraph 1) that includes ground states represented by filling a Fermi sphere (page 5363, paragraph 1).

As also noted, Bogoliubov does not explicitly disclose the use of root space vectors and Lie algebra coset decomposition.

However, as admitted by applicants, and disclosed in the specification the features relating to root space vectors and Lie algebra coset decomposition were well known in the art at the time of the invention. (See: page 5, last paragraph, page 6, paragraph 2 (Science, Rosner, Vol. 290, 200, p 2083), page 7, paragraphs 2-4, page 8, paragraphs 1-3 (Nature, Jaffe, Vol. 268, p 201, 1977), for example)

Accordingly, a skilled tasked with realizing a method and apparatus for producing a model of an elementary particle, and having access to the teachings of Bogoliubov and applicants admitted prior art, would have knowingly modified the teachings of Boboliubov with the admitted prior art to realized the elements of the present invention as presently claimed. An obvious motivation exists since, as recognized in applicants admitted prior art, it has already been established that coset decomposition algebra can be projected in real geometry. (See: page 5, last paragraph, Kleppner and Jackow)

Boboliebov and AOA do not explicitly disclose a creating graphical representation of the model of elementary particles. (e. g. representing the model of elementary particles in a figurative or physical medium)

IRIS Explorer discloses a commercially available software product capable of providing a visualization of (Section 1.6 to 1.6.2) of particle models (elementary,

subatomic, etc.) generated by computer graphics. Hence, a skilled artisan would have further known to modify the teachings of Boboliebov and AOA with the teachings of IRIS Explorer as a method of providing a visual representation of the elementary particle model using the same reasoning previously set forth above. Here the examiner has interpreted a figurative or physical medium to be visual or graphical display of the elementary particles represented by the model.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Careful consideration should be given prior to applicant's response to this Office Action.

"Dynamic Model of Elementary Particles Based on an Analogy with Superconductivity. I", Nambu et al, Physical Review, Vol. 122, No. 1, April 1961 teaches elementary particle modeling.*

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry

of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached at 571-272-2279. The Official Fax Number is: (571) 273-8300

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